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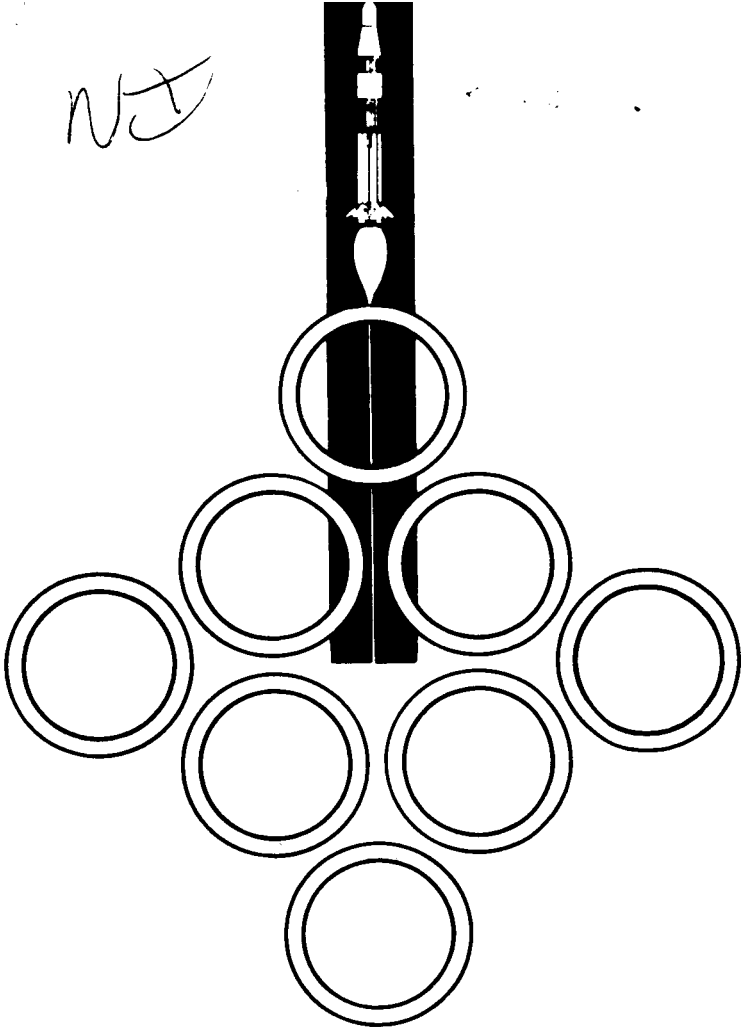

ENGINEERING DEPARTMENT

TECHNICAL REPORT

TR-RE-CCSD-FO-1116-3

June 30, 1967

SATURN IB PROGRAM

TEST REPORT
FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

SPACE DIVISION CHRYSLER CORPORATION

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

ABSTRACT

This report presents the results of tests performed on one specimen of Globe Valve 75M09618-PGLV-2. The following tests were performed:

1. Receiving Inspection
2. Proof Pressure
3. Functional
4. Flow
5. Surge
6. Low Temperature
7. High Temperature
8. Sand and Dust
9. Salt Fog
10. Cycle
11. Burst

The specimen's performance was in accordance with the specification requirements of NASA Drawing Number 75M09618-PGLV-2 except during the low temperature test and the burst test.

While stabilized at -20°F, the valve leaked excessively during the functional test.

During burst testing, the valve failed at 22,000 psig. The specification requirements were that the valve withstand a minimum burst pressure of 24,000 psig.

RE-RE-CCSD-FO-1116-3F

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

June 30, 1967

CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS 8-4016, Part VII, CWO 271620.

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Globe Valve 75M09618 PGLV-2

CHECK SHEET

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

MANUFACTURER: Control Components, Inc.
MANUFACTURER'S MODEL NUMBER: MV6306T-P
NASA DRAWING NUMBER: 75M09618 PGLV-2
TEST AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana
AUTHORIZING AGENCY: NASA KSC

I. FUNCTIONAL REQUIREMENTS

A.	OPERATING MEDIUM:	He or GN_2
B.	OPERATING PRESSURE:	6000 psig
C.	PROOF PRESSURE:	9000 psig
D.	BURST PRESSURE:	24,000 psig
E.	VALVE CAPACITY(C_v):	1.16
F.	TORQUE - Valve stem maximum:	
	Breakaway	5 ft-lb maximum with 6000 psig above seat
	Running	2 ft-lb maximum
	Seating	5 ft-lb maximum against 6000 psig

II. CONSTRUCTION

A.	BODY MATERIAL:	316 stainless steel
B.	SEAT MATERIAL:	Teflon
C.	OUTLET PORT:	0.344 diameter
D.	INLET PORT:	0.344 diameter
E.	SECTIONAL DIMENSIONS:	Drawing MB6306

III. ENVIRONMENTAL REQUIREMENTS

OPERATING TEMPERATURE	-100 to +250°F

IV. SPECIAL REQUIREMENTS: CCI PS 302 (Vapor-Degrease)

V. LOCATION AND USE:

Used in the pneumatic supply system of John F. Kennedy Space Center Launch Complex 34.

TEST SUMMARY

GLOBE VALVE, 3/8-INCH, 6000 PSIG

75MO9618 PGLV-2

Environment	Units	Operational Boundary	Test Objective	Test Results	Remarks
Receiving Inspection	1	Specifications and drawings	Conformance to specifications and drawings	Satisfactory	
Proof Pressure Test	1	9000 psig	Check for leakage and distortion	Satisfactory	No leakage or distortion
Functional Test	1	6000 psig Torque requirements: Breakaway: 5 ft-lb; Running: 2 ft-lb; Seating: 5 ft-lb	Check seat leakage torque values	Satisfactory	No leakage
Flow Test	1	C_V of 1.16	Determine C_V	Satisfactory	Maximum C_V was found to be 1.07
Surge Test	1	0 to 6000 psig in 100 milliseconds. 10 cycles with valve closed, and 10 cycles with valve partially open	Determine if specimen operation is impaired by surge	Satisfactory	No leakage or distortion
Low Temperature Test	1	-20 (+0, -4)°F	Determine if specimen operation is impaired by low temperature	Unsatisfactory	Specimen leaked excessively at -20°F 60 in-lb Seated at 96 in-lb.
High Temperature Test	1	+160 (+4, -0)°F	Determine if specimen operation is impaired by high temperature	Satisfactory	No leakage or distortion
Sand and Dust Test	1	Subjected for 2 hours at 77°F and 2 hours at 160°F	Determine if the specimen is impaired by the environmental change	Satisfactory	No leakage or distortion

TEST SUMMARY (CONTINUED)

GLOBE VALVE, 3/8-INCH, 6000 PSIG

75M09618 PGLV-2

Environment	Units	Operational Boundary	Test Objective	Test Results	Remarks
Salt Fog Test	1	240 (±2) hours	Determine if specimen is impaired by environmental change	Satisfactory	No leakage or distortion
Cycle Test	1	1000 cycles with 6000 psig on inlet of specimen	Determine if specimen is impaired by cycling	Satisfactory	No leakage or distortion
Burst Test	1	Minimum of 24,000 psig for 5 minutes	Check for structural damage and leakage at minimum burst pressure	Satisfactory	Specimen leaked at 22,000 psig initially, but was satisfactory after packing gland nut was retorqued

SECTION I

INTRODUCTION

1.1 SCOPE

1.1.1 This report describes the tests of Globe Valve 75M09618 PGLV-2. Tests included were those necessary to determine whether the valve will satisfy the operational and environmental requirements of the John F. Kennedy Space Center. A summary of the test results is presented on pages viii and ix.

1.1.2 One specimen was tested.

1.2 ITEM DESCRIPTION

1.2.1 Globe Valve 75M09618 PGLV-2 has a 3/8-inch nominal size inlet port. It has a design operating pressure of 6000 psig and is rated for use with nitrogen and helium.

1.3 APPLICABLE DOCUMENTS

The following documents contain the test requirements for Globe Valve 75M09618 PGLV-2:

a. KSC-STD-164(D), Standard Environmental Test Methods for Ground Support Equipment Installations at Cape Kennedy

b. Component Specification 75M09618 PGLV-2

c. Cleanliness Standard MSFC-STD-164(D)

d. Test Plan CCSD-FO-1116-1F

e. Test Procedure CCSD-FO-1116-2F

SECTION II

RECEIVING INSPECTION

2.1 REQUIREMENTS

The test specimen shall be visually and dimensionally inspected for conformance with NASA drawing 75M09618 PGLV-2 and applicable specifications. Inspection shall not include disassembly of the specimen.

2.2 PROCEDURE

A visual and dimensional inspection was performed to determine compliance with NASA drawing 75M09618 PGLV-2 and applicable vendor drawings to the extent possible without disassembling the test specimen. Inspections were also made for poor workmanship and manufacturing defects. Equipment used in the inspections is listed in table 2-1.

2.3 TEST RESULTS

The specimen complied with NASA drawing 75M09618 PGLV-2. No evidence of poor workmanship or other manufacturing defects was observed.

2.4 TEST DATA

The data presented in table 2-2 were recorded during the inspection.

Table 2-1. Receiving Inspection Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Cal. Date
1	Steel Scale	Brown & Sharpe	300	NASA 101-1013	7-23-64

Table 2-2. Receiving Inspection Test Data

Item	Specified Dimensions (inches)	Actual Dimensions (inches)
Overall Height(closed)	5.03	5.33
Overall Height(open)	5.36	5.65
Housing Length	2.50	2.50
Housing Height	1.75	1.905
Housing Width	1.25	1.25

SECTION III

PROOF PRESSURE TEST

3.1 TEST REQUIREMENTS

3.1.1 The test specimen shall be subjected to a proof pressure of 9000 psig.

3.1.2 The pressure shall be simultaneously applied to the inlet and outlet ports, with the valve in the open position, and shall be maintained for 5 minutes.

3.1.3 The specimen shall be inspected for leakage and distortion.

3.2 TEST PROCEDURE

3.2.1 The test specimen was installed in the test setup as shown in figures 3-1 and 3-2 utilizing the equipment listed in table 3-1.

3.2.2 Hand valve 7 and regulator 21 were closed.

3.2.3 The test specimen and hand valves 5, 6, 8, 9, 10, 11, and 24 were opened and the system was filled with de-ionized water 2. All air was bled from the system.

3.2.4 Hand valves 5, 8, 9, 11 and 24 were closed.

3.2.5 Hand valve 7 was opened, and 3000 psig GN_2 was monitored on gage 14.

3.2.6 Regulator 21 was adjusted until a pressure of between 50 and 100 psig was indicated on gage 15.

3.2.7 Switch 17 was then closed. Solenoid valve 18 was opened and pump 19 started.

3.2.8 The pump continued to operate until a pressure of 9000 psig was indicated on gage 3. Switch 17 was then opened to stop pumping.

3.2.9 The 9000 psig pressure was maintained for 5 minutes, and the specimen was checked for leakage.

3.2.10 Hand valves 9, 11 and 24 were opened to vent the system, and the specimen was then checked for distortion.

3.2.11 All data were recorded.

3.3 TEST RESULTS

The specimen did not leak and there was no evidence of distortion.

3.4 TEST DATA

The test data presented in table 3-2 were recorded during the test.

Table 3-1. Proof Pressure and Burst Test Equipment List

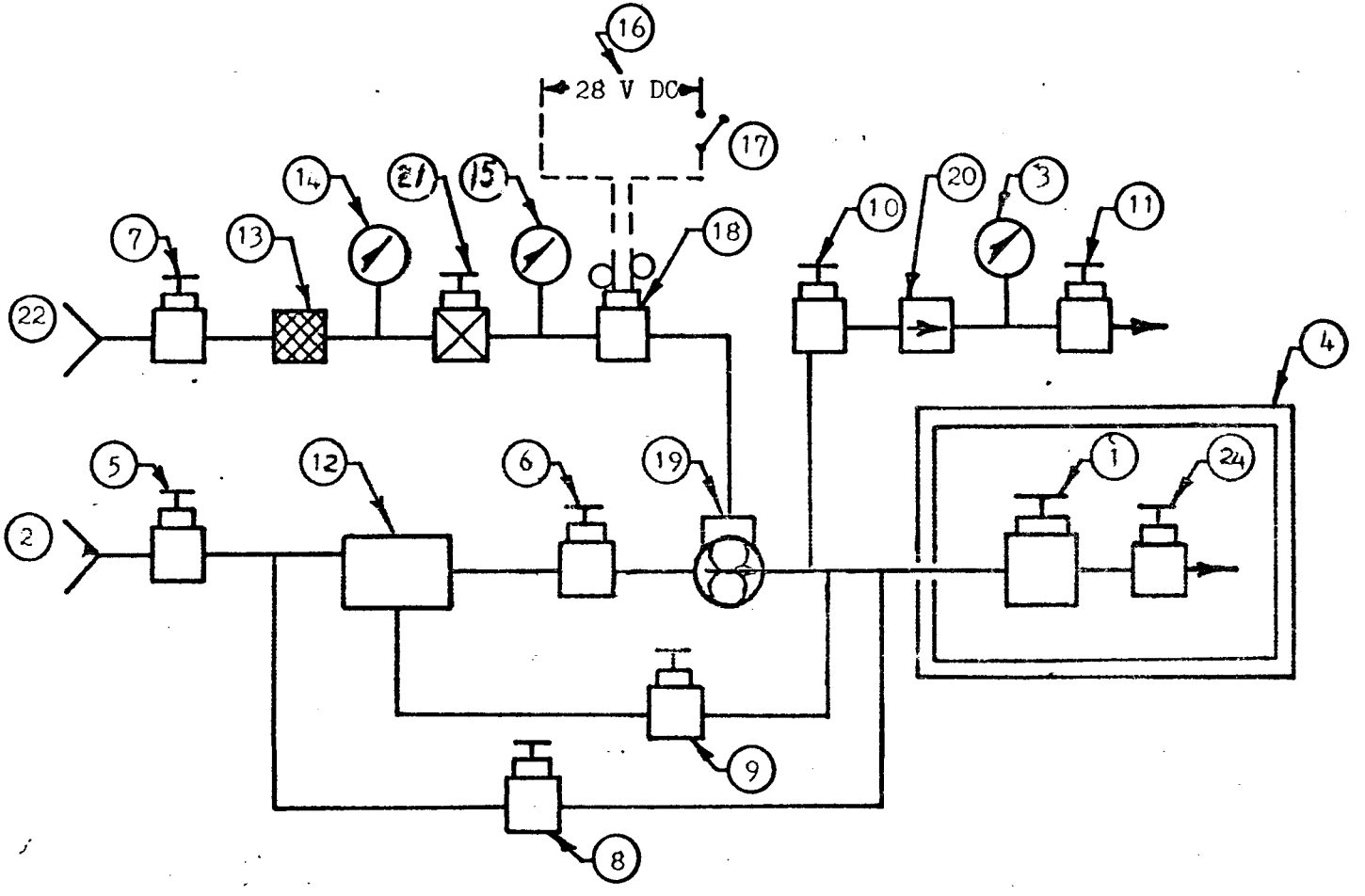
Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Control Components Inc.	MV6306T-P	NA	3/8-inch globe valve
2	Water Supply		NA	NA	Deionized
3	Hydrostatic Pressure Gage	Astra	NA	011893	0-to 100,000-psig ±2.0% FS Cal date 11-2-66
4	Burst Chamber	CCSD	NA	201344	3 ft x 3 ft x 3 ft
5	Hand Valve	Aminco	50011A	NA	1/4-in.
6	Hand Valve	Aminco	50011A	NA	1/4-in.
7	Hand Valve	Aminco	50011A	NA	1/4-in.
8	Hand Valve	Aminco	50011A	NA	1/4-in.
9	Hand Valve	Aminco	50011A	NA	1/4-in.
10	Hand Valve	Aminco	50011A	NA	1/4-in.
11	Hand Valve	Aminco	50011A	NA	1/4-in.
12	Water Reservoir	CCSD	NA	NA	2-gal.
13	Pneumatic Filter	Bendix Corporation	1731260	NA	2-micron
14	Pressure Gage	Ashcroft	10575	NA	0-to 5000-psig ±2% FS
15	Pressure Gage	Duragauge	8990	NA	0-to 300-psig ±2% FS
16	Power Supply	CCSD	NA	NA	28 vdc
17	Switch	Cutler-Hammer	NA	NA	SPST
18	Solenoid Valve	Marotta Valve Co.	207803	NA	2-way normally closed
19	Hydrostatic Pump	Sprague Engr. Corp.			Air operated; maximum pressure 50,000 psig

Table 3-1. Proof Pressure and Burst Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
20	Check Valve	Aminco	44-6305	NA	1/4-in.
21	Regulator	Marotta Valve Co	NA	NA	3000-psig inlet; 0-to 200-psig outlet
22	GN_2 Pressure Source	Air Products	NA	NA	3000-psig
24	Hand Valve	Aminco	50011A	NA	1/4-in.

Table 3-2. Proof Pressure Test Data

Pressure	9,000 psig/5 minutes
Leakage	Zero
Distortion	None



Note: All lines 1/4-inch except for 1/2-inch chamber lines.
Refer to table 3-1 for item identification.

Figure 3-1. Proof Pressure and Burst Test Schematic

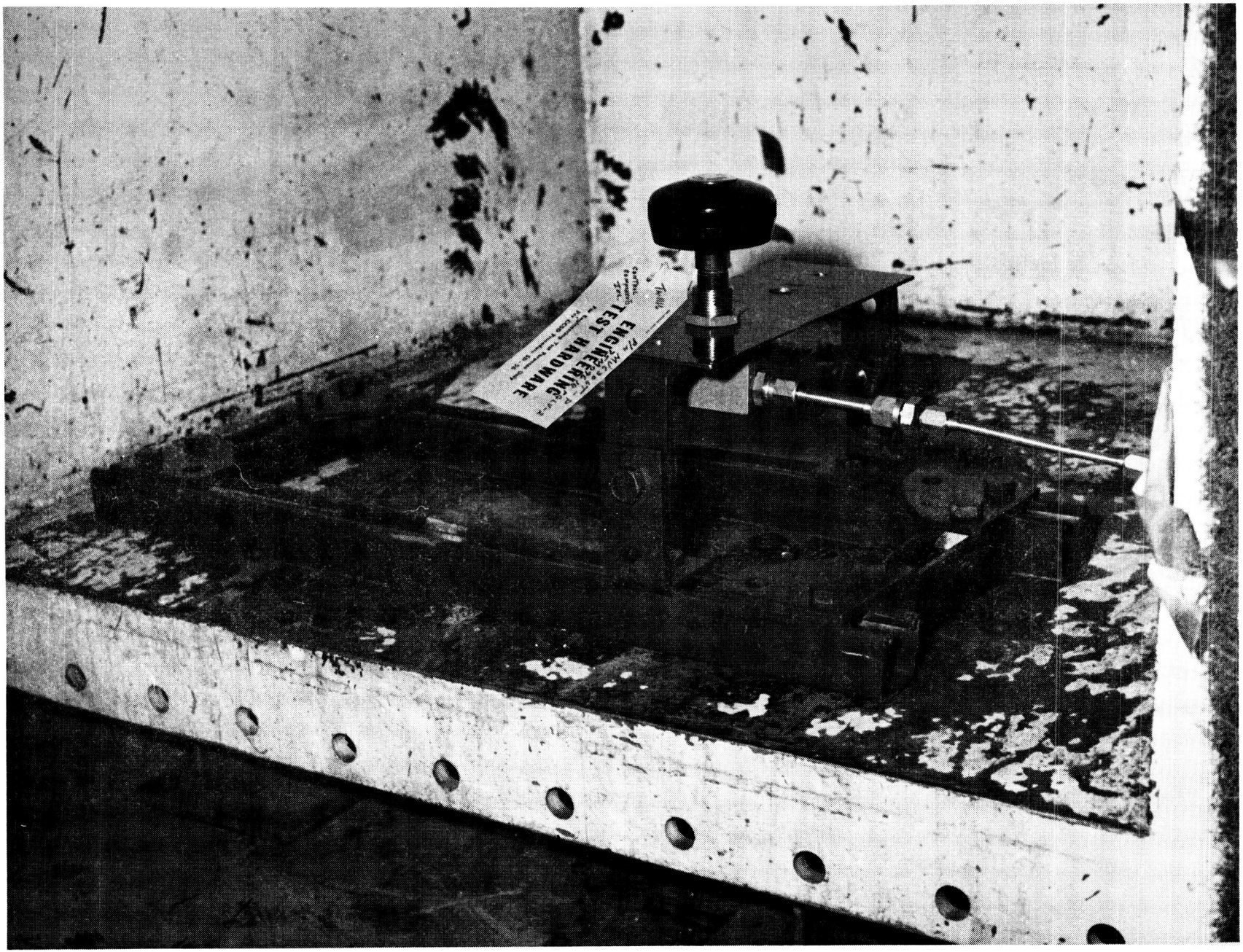


Figure 3-2. Proof Pressure and Burst Test Setup

SECTION IV

FUNCTIONAL TEST

4.1 TEST REQUIREMENTS

4.1.1 The test specimen shall be inspected for leakage with the outlet port of the specimen pressurized to 6000 psig, specimen closed, and the inlet port vented. Leakage shall be recorded (see figure 4-2).

4.1.2 The test specimen shall be inspected for leakage with the inlet port of the specimen pressurized to 6000 psig, specimen closed, and the outlet port vented. Leakage shall be recorded.

4.1.3 The opening, closing, and normal running torque of the valve shall be determined with the inlet port pressurized to 6000 psig and then relieved to zero psig.

4.1.4 The procedures described in 4.1.1 and 4.1.2 shall be repeated for the initial functional test and performed for all subsequent functional tests. The procedure described in 4.1.3 shall be performed ten times initially and three times for all subsequent functional tests.

4.2 TEST PROCEDURE

4.2.1 The test setup was assembled as shown in figures 4-1 and 4-2 using the equipment listed in table 4-1 except for thermocouple 17 and thermal chamber 18. All hand valves were closed. Flex hose 20 (port A) was connected to the outlet port of the specimen and flex hose 21 (port B) was connected to the inlet port.

4.2.2 The hand wheel of the test specimen was replaced with torque wrench 13 and the test specimen was closed using the maximum seating torque of 15 inch-pounds.

4.2.3 Regulators 6 and 15 were adjusted for zero outlet pressure.

4.2.4 Hand valve 3 was slowly opened, and gage 5 indicated 7000 psig.

4.2.5 Regulator 6 was adjusted to establish 6000 psig, as indicated on pressure gage 7.

4.2.6 Hand valve 10 was opened to determine the amount of leakage by the displacement of water in graduated cylinder 11.

4.2.7 Regulator 6 was adjusted for zero outlet pressure and hand valve 8 was opened to vent the specimen.

4.2.8 Hand valves 8 and 10 were closed.

4.2.9 Flex hose 20 (port A) was connected to the inlet port of the specimen and flex hose 21 (port B) was connected to the outlet port.

4.2.10 The procedures described in 4.2.5 through 4.2.8 were repeated.

4.2.11 By adjusting regulator 6, the specimen pressure, as indicated on pressure gage 7, was slowly increased to 6000 psig.

4.2.12 The breakaway torque of the specimen was measured by slowly applying the maximum torque required to unseat the specimen.

4.2.13 After the breakaway torque was measured, the specimen was completely opened. The running torque required from breakaway until the specimen fully opened was measured.

4.2.14 The specimen was closed and the closing running torque was measured.

4.2.15 Hand valve 9 was opened and closed to vent the outlet pressure of the specimen. Hand valve 10 was opened.

4.2.16 The specimen was slowly opened until bubbles appeared in water tank 12.

4.2.17 The specimen was slowly closed and the torque required to stop the bubbles in water tank 12 was measured. This was the closing torque for the specimen at operating pressure.

4.2.18 Regulator 6 and hand valve 10 were closed.

4.2.19 Hand valves 8 and 9 were opened and closed to vent the specimen.

4.2.20 The procedures described in 4.2.12 through 4.2.14 were repeated to determine breakaway and running torque values for the unpressurized specimen.

4.2.21 Flex hose 20 (port A) was disconnected and capped, and flex hose 19 (port C) was connected to the inlet port of the specimen.

4.2.22 Regulator 6 was adjusted to establish 100 psig on pressure gage 7.

4.2.23 Hand valve 14 was opened.

4.2.24 Regulator 15 was slowly adjusted, establishing a 2-psig reading on pressure gage 16.

4.2.25 Hand valve 10 was opened.

4.2.26 The test specimen was slowly opened until bubbles appeared in water tank 12.

4.2.27 The test specimen was slowly closed and the torque required to stop the bubbles was measured. This was the closing torque for the specimen when it was unpressurized.

4.2.28 Regulators 6 and 15 were closed and hand valve 8 was opened to vent the supply pressure.

4.2.29 Hand valves 8, 10, and 14 were closed.

4.2.30 Flex hose 19 (port C) was disconnected and port A of flex hose 20 was uncapped and connected to the inlet of the specimen.

4.2.31 The test specimen was closed using the maximum seating torque as specified.

4.2.32 The procedures described in 4.2.11 through 4.2.31 were performed ten times and the procedures described in 4.2.1 through 4.2.10 were repeated once for the initial functional test.

4.2.33 For all subsequent tests, the procedures described in 4.2.11 through 4.2.30 were performed three times and 4.2.1 through 4.2.10 were performed once.

4.3 TEST RESULTS

The test specimen functioned satisfactorily during the initial functional test.

4.4 TEST DATA

Initial functional test data are presented in table 4-2.

Table 4-1. Functional Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Control Components Inc.	MV6306T-P	NASA 75M09618 PGLV-2	3/8-inch globe valve
2	He Source	CCSD	NA	NA	7000-psig
3	Hand Valve	Combination Pump and Valve Co.	380-3	NA	1½-in.
4	Filter	Microporous	4813F-2M	NA	2-micron
5	Pressure Gage	Duragauge	NA	NASA	0-to 10,000-psig 1 (±0.2)% FS Cal date 1-25-67
6	Pressure Regualtor	Tescom Corp.	26-1002	1002	7000-psig inlet 0-to 7000-psig outlet
7	Pressure Gage	Ashcroft	10575	NA	0-to 10,000-psig ±0.25% FS Cal date 11-25-66
8	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.
9	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.
10	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.
11	Graduated Cylinder	Pyrex Co.	NA	NA	For leakage measurement
12	Water Tank	CCSD	NA	NA	Leakage detector
13	Torque Wrench	Armstrong	SR-100	NASA 95-1318B	Replaces hand wheel of specimen (when required) Cal date 8-7-66
14	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.

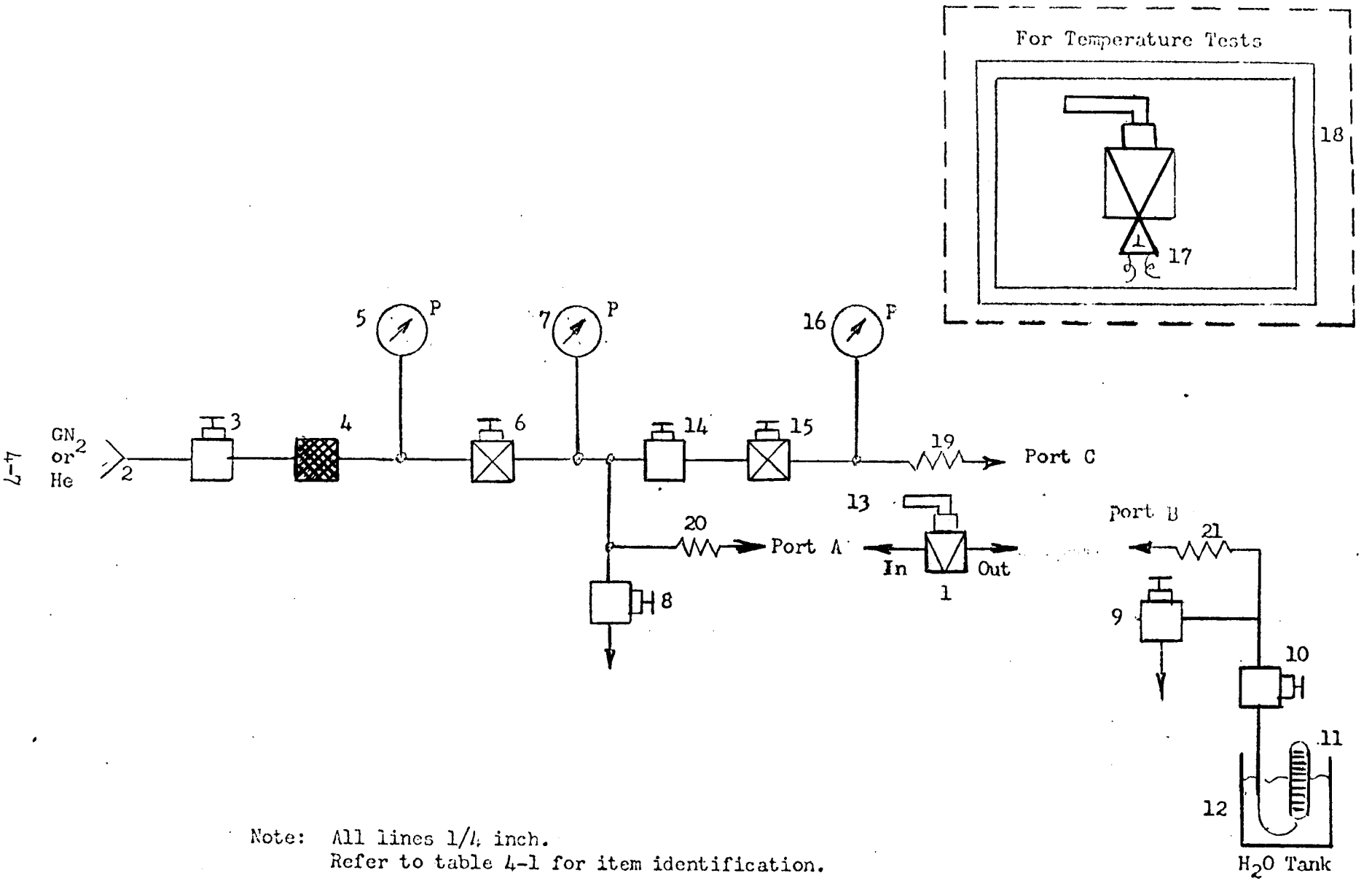
Table 4-1. Functional Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
15	Pressure Regulator	Tescom Corp.	26-1002	1009	100-psig inlet 0-to 10-psig
16	Pressure Gage	Marsh Instrument	NA	NASA 08-113-1142B	0-to 30-psig ±0.5% FS Cal date 1-10-67
17	Thermocouple	Honeywell Corp.	30112	NA	-50 to 200 (±2.5)°F (temperature tests only)
18	Thermal Chamber	Conrad Corp.	NA	NASA 08-113-2049-41	-30 to 180°F (temperature tests only)
19	Flex Hose	NA	NA	NA	1/4-in.
20	Flex Hose	NA	NA	NA	1/4-in.
21	Flex Hose	NA	NA	NA	1/4-in.

Table 4-2. Initial Functional Test Data

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	60	6000	45	15	20	20
	60	10	58	6	6	--
		10		--	--	22
2	60	6000	60	16	21	20
	60	10	58	6.5	6	--
		10		--	--	19
3	60	6000	50	16	21	20
	60	10	58	5	5	--
		10		--	--	19
4	60	6000	50	16	21	20
	60	10	60	5	5	--
		10		--	--	17
5	60	6000	50	17	22	20
	60	10	55	6	6	--
		10		--	--	17
6	60	6000	50	15	21	20
	60	10	40	5.5	5	--
		10		--	--	16
7	60	6000	50	16	21	20
	60	10	43	6.5	6.5	--
		10		--	--	20
8	60	6000	55	15	21	20
	60	10	50	7	7	--
		10		--	--	20
9	60	6000	40	15	21	20
	60	10	43	6.5	5.5	--
		10		--	--	18
10	60	6000	40	16	21	20
	60	10	50	5.5	5	--
		10		--	--	17

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	5	6000	0	None
	5	0	6000	None
2	5	6000	0	None
	5	0	6000	None



Note: All lines 1/4 inch.
Refer to table 4-1 for item identification.

Figure 4-1. Functional Test Schematic

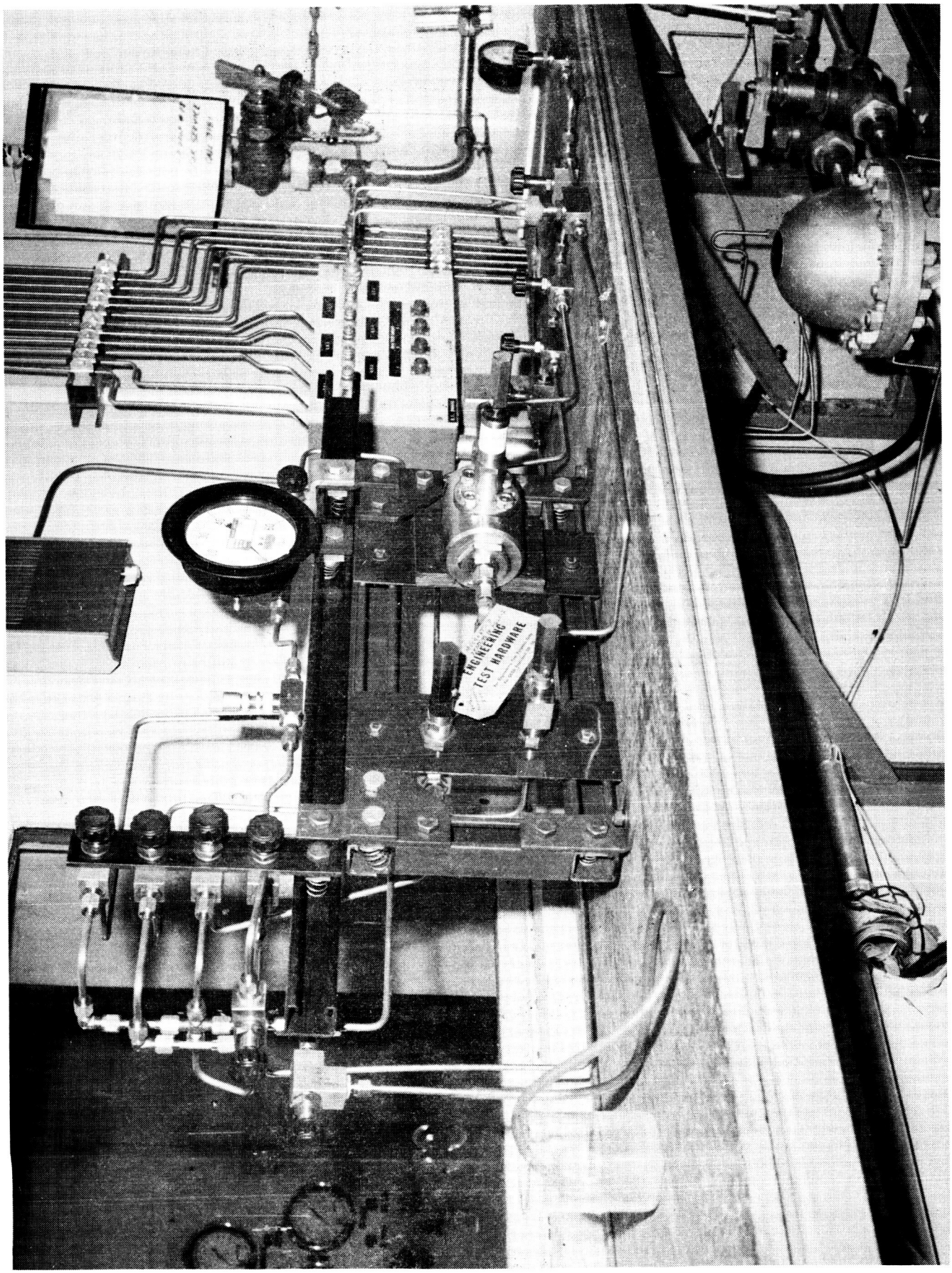


Figure 4-2. Functional Test Setup

SECTION V

FLOW TEST

5.1 TEST REQUIREMENTS

5.1.1 The valve capacity (C_V) of the specimen shall be determined. The minimum C_V shall be 1.16.

5.1.2 A flow rate versus pressure drop curve shall be developed.

5.2 TEST PROCEDURE

5.2.1 The test specimen was installed in the test setup as shown in figures 5-2 and 5-3 using the equipment listed in table 5-1. Each hand valve and regulator 5 was closed.

5.2.2 The test specimen was opened.

5.2.3 Hand valve 3 was opened and gage 4 was monitored for 100 psig.

5.2.4 Regulator 5 was used to vary the flow through the system to obtain temperature and pressure data.

5.2.5 Eleven readings of inlet pressure, pressure drop and water temperature were recorded from flowmeter 7, gages 9, 10 and 11, and thermocouple 8.

5.3 TEST RESULTS

5.3.1 The flow coefficient (C_V) of the 3/8-inch globe valve was an average of 1.06 when calculated over a flow range between 3 and 8 gallons per minute. This was slightly under the minimum required C_V of 1.16.

5.4 TEST DATA

5.4.1 The test data recorded during the test and during a functional test following the flow test are presented in tables 5-2 and 5-3. Flow rate versus pressure drop is presented in figure 5-1.

5.4.2 The flow coefficient (C_V) was computed using the following formula:

$$C_V = Q \sqrt{\frac{\rho_T}{\rho \Delta P}}$$

Where:

Q = Measured flow rate (gpm)
ΔP = Pressure drop across the specimen (psid)
ρ_T = Density of the water at the temperature indicated by the temperature probe
ρ = Density of the water at 60°F

Table 5-1. Flow Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Control Components Inc.	MV6306T-P	NASA 75M09618 PGLV-2	3/8-in. globe valve
2	Water Supply	NA	NA	NA	NA
3	Hand Valve	Williams Co.	200SP	NA	2-in.
4	Pressure Gage	Heise	NA	NASA 08-113-93-1092-C	0-to 1000-psig ±0.2% FS Cal date 12-30-66
5	Pressure Regulator	Denison Division, American Brake Shoe Co.	FCC122 3106	NA	1-in.
6	Pressure Gage	Ashcroft	NA	NASA 08-113-95-1209-B	0-to 1000-psig ±1.0% FS Cal date 1-30-67
7	Thermocouple	West Instrument Corp.	30112	NA	-50 to +200 (±2.5)°F Cal date 2-31-67
8	Turbine Flowmeter	Cox Instrument Division	16-SCRX	3498	0-to 50-gpm Cal date 12-16-66
9	Pressure Gage	Heise		NASA 08-113-95-1637-B	0-to 100-psig ±0.2% FS Cal date 12-30-66
10	Pressure Gage	Heise		NASA 08-113-95-1083-C	0-to 100-psig ±0.2% FS Cal date 12-30-66
11	Pressure Gage	Heise		NASA 08-113-93-1064-C	0-to 100-psig ±0.2% FS Cal date 12-30-66
12	Hand Valve	Williams Co.	200 SP	NA	2-in.

Table 5-2. Flow Test Data

Flow (gpm)	Specimen Pressure		Tare (psi)	ΔP (psi)	Media Temperature (°F)	Flow Coefficient (C_v)
	Upstream (psig)	Downstream (psig)				
3	13.8	4.0	1.8	8.0	49	1.06
4	23.3	6.2	2.8	14.3	49	1.06
5	36.3	9.3	4.3	22.7	49	1.05
6	50.8	12.8	6.1	31.9	49	1.06
7	69.3	17.2	8.3	43.8	49	1.06
8	88.2	21.4	10.5	56.3	49	1.07
7	68.0	16.5	8.2	43.3	49	1.06
6	50.4	12.4	6.2	31.8	49	1.06
5	35.5	8.7	4.2	22.6	49	1.05
4	23.4	6.0	2.9	14.5	49	1.06
3	13.8	3.7	1.8	8.3	49	1.06

Table 5-3. Data on Functional Test Following the Flow Test

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	25	6000	19	18	23	16.5
	25	0	20	10	9	--
	25	2	--	--	--	17
2	25	6000	19	19	28	15
	25	0	20	10	9	--
	25	2	--	--	--	16
3	25	6000	19	21	28	17
	25	0	20	10	9	--
	25	2	--	--	--	16

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	25	6000	0	0
	25	0	6000	0
2	25	6000	0	0
	25	0	6000	0

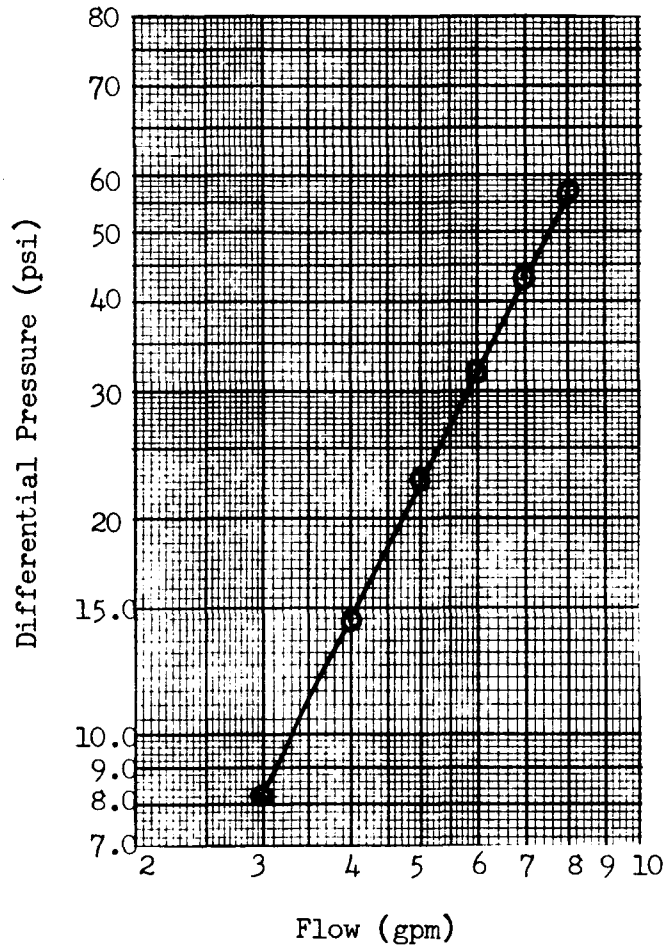
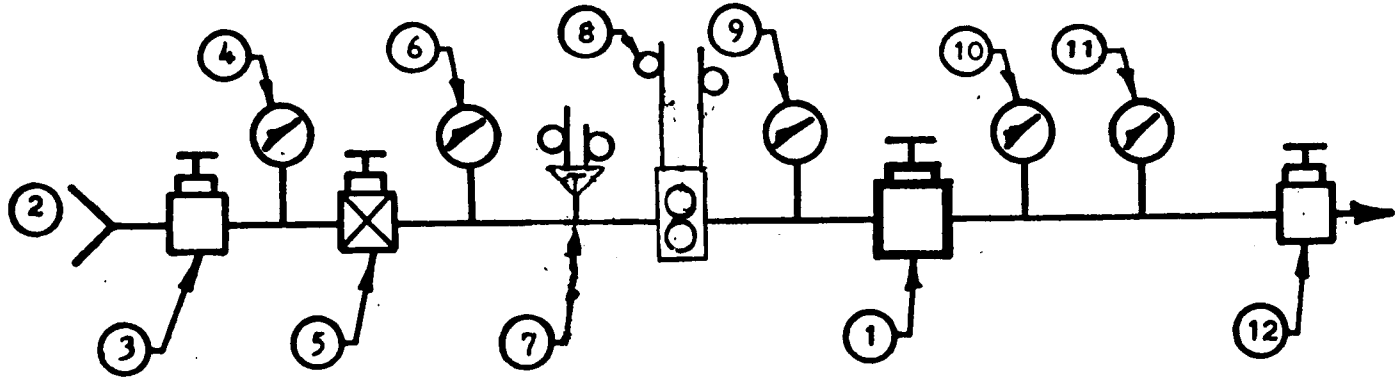


Figure 5-1. Flow Rate Versus Pressure Drop



Note: All lines 3/4-inch except for one-inch water source lines and 1/4-inch gage lines.
Refer to table 5-1 for item identification

Figure 5-2. Flow Test Schematic

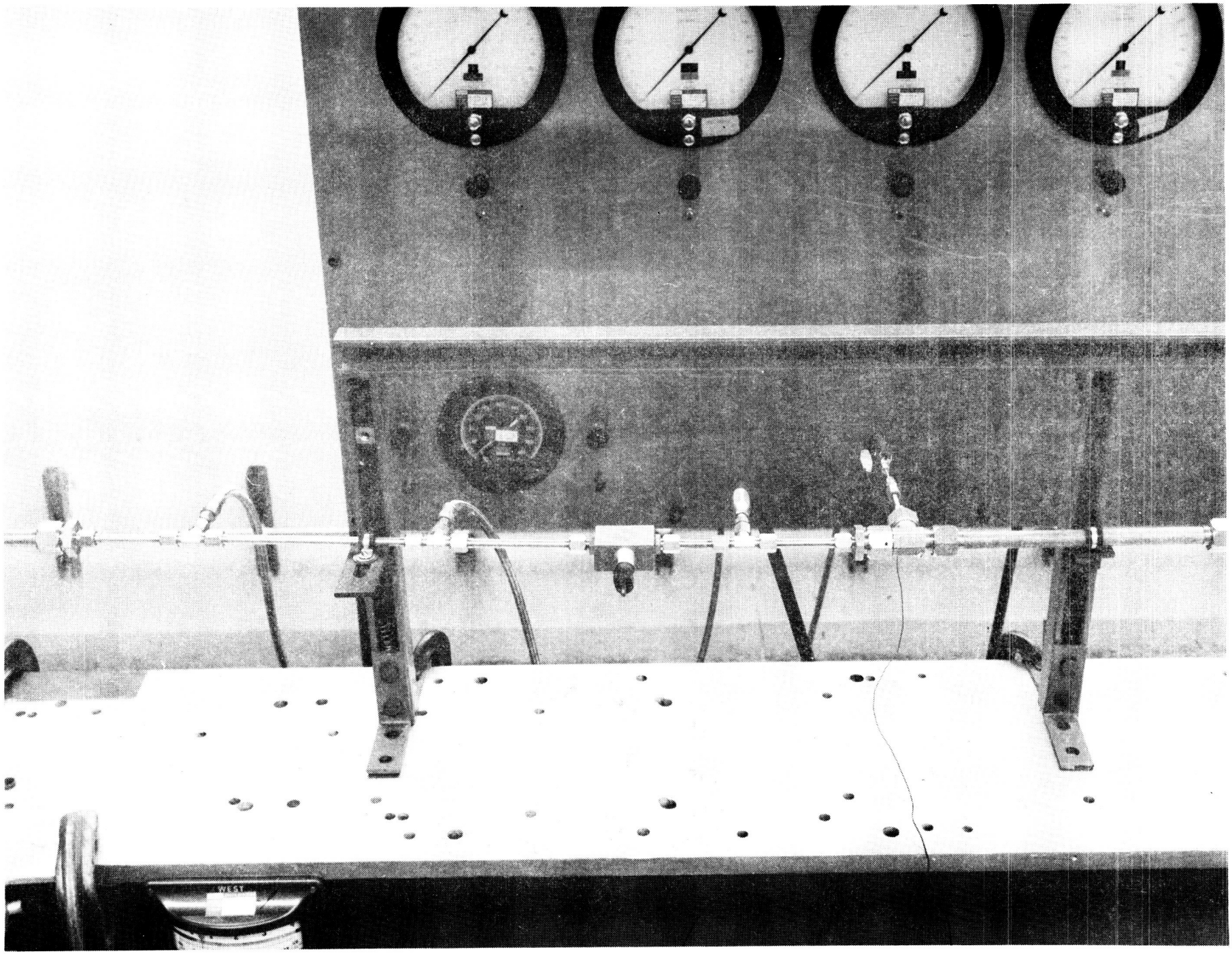


Figure 5-3. Flow Test Setup

SECTION VI

SURGE TEST

6.1 TEST REQUIREMENTS

6.1.1 The test specimen shall be subjected to 20 pressure surges, 10 with the specimen closed and 10 with the specimen partially opened and the vent port of solenoid valve 8 capped.

6.1.2 Each pressure surge shall be a pressure increase from zero to 6000 psig within 100 milliseconds.

6.1.3 The downstream side of the specimen shall be vented after each surge, when the specimen is partially opened.

6.2 TEST PROCEDURE

6.2.1 The test specimen was installed in the test setup as shown in figure 6-2 and 6-3 using the equipment listed in table 6-1. All hand valves, regulators, and the specimen were closed for zero pressure.

6.2.2 Hand valve 2 was opened.

6.2.3 Pressure gage 4 indicated the supply pressure of 7000 psig.

6.2.4 Regulator 5 was adjusted until gage 6 showed 6000 psig.

6.2.5 Hand valve 7 was opened and switch 18 was closed, energizing solenoid valve 8 into the open position. The inlet port of the specimen was pressurized to 6000 psig.

6.2.6 The output from pressure transducer 15 and the time for each run were recorded on oscillograph 16.

6.2.7 Switch 18 was opened to deactuate solenoid valve 8 and hand valve 7 was closed.

6.2.8 The procedures in 6.2.5 through 6.2.7 were repeated 10 times.

6.2.9 The test sample was partially opened (cracked), and the vent port of solenoid valve 8 was capped.

6.2.10 The procedures in 6.2.5 through 6.2.7 were repeated for 10 additional cycles, opening hand valve 12 after each cycle to vent the downstream pressure from the specimen.

6.2.11 The specimen was examined for distortion after each cycle, and functionally tested prior to and after surge testing.

6.3 TEST RESULTS

The specimen was cycled ten times in the closed position with a pressure of 0 to 6000 psig within 60 milliseconds. The second

ten cycles were performed with the valve in the partially opened position, cracked, and pressurized from 0 to 6000 psig within 60 milliseconds. The specimen demonstrated no adverse effects from the test.

6.4 TEST DATA

6.4.1 A typical surge waveform as recorded during the test is shown in figure 6-1.

6.4.2 Data recorded during the post-surge functional test are presented in table 6-2.

Table 6-1. Surge and Cycle Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Control Components Inc.	MV6306T-P	NASA 75M09618 -PGLV	3/8-in. globe valve
2	Hand Valve	Combination Pump and Valve Co.	380-3	NA	1½-in. supply
3	Filter	Microporous	4813F-2M	NA	2-micron
4	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-P	0-to 10,000-psig ±0.2% FS Cal date 3-7-67
5	Pressure Regulator	Tescom Corp.	26-1002	1004	7000 psig inlet 0-to 7000-psig outlet
6	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-Q	0-to 10,000-psig ±0.2% FS Cal date 3-7-67
7	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.
8	Solenoid Valve	Marotta Valve Co.	MV-583	3696	3-way, ½-in.
9	Hand Valve	Robbins Aviation	SSKG-250 -4T	NA	1/4-in.
10	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-B	0-to 10,000-psig ±0.2% FS Cal date 3-7-67
11	Helium and Nitrogen Source	CCSD	NA	NA	7000 psig
12	Hand Valve	Robbins Aviation	SSKG 250 -4T	NA	1/4-in.
13	Solenoid Valve	Marotta Valve Co.	MV-583	2916	3-way, ½-in.
14	Motor and Gear Reduction	Westinghouse	NA	NA	

Table 6-1. Surge and Cycle Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
15	Pressure Transducer	Teledyne	176	652137	0-to 7500-psig ±0.2% FS
16	Oscillograph Recorder	C. E. C.	5-124	NASA-017887	
17	Electrical Supply	Plant Services	NA	NA	28 vdc and 115 vac
18	Switch	Cutler-Hammer	NA	NA	SPST

Table 6-2. Data on Functional Test Following Surge Test

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	24	6000	20	18	26	50
	24	0	21	10	9	--
	24	2	--	--	--	21
2	44	6000	29	20	23	48
	44	0	22	9	8	--
	44	2	--	--	--	18
3	30	6000	27	19	26	49
	30	0	24	9	8	--
	30	2	--	--	--	20

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	24	6000	0	0
	24	0	6000	0

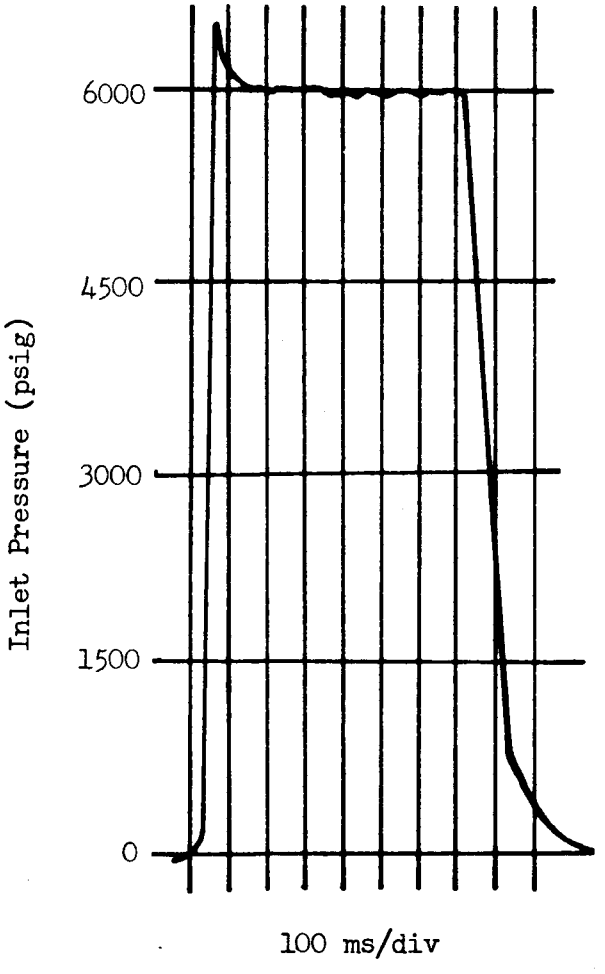
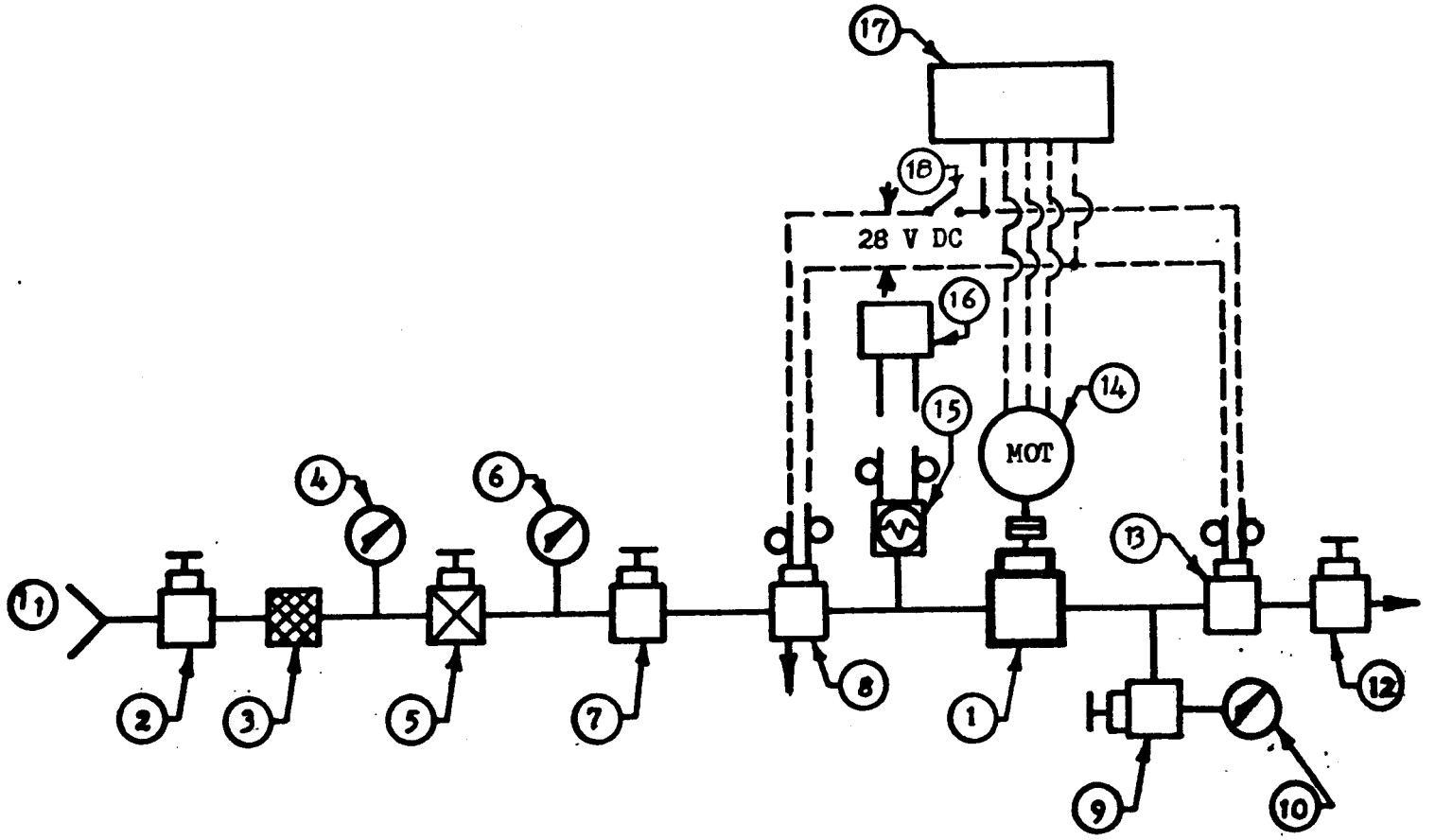


Figure 6-1. Typical Surge Waveform



Note: All lines $\frac{1}{2}$-inch except for gage lines which are $\frac{1}{4}$-inch.
Refer to table 6-1 for item identification.

Figure 6-2. Surge and Cycle Test Schematic

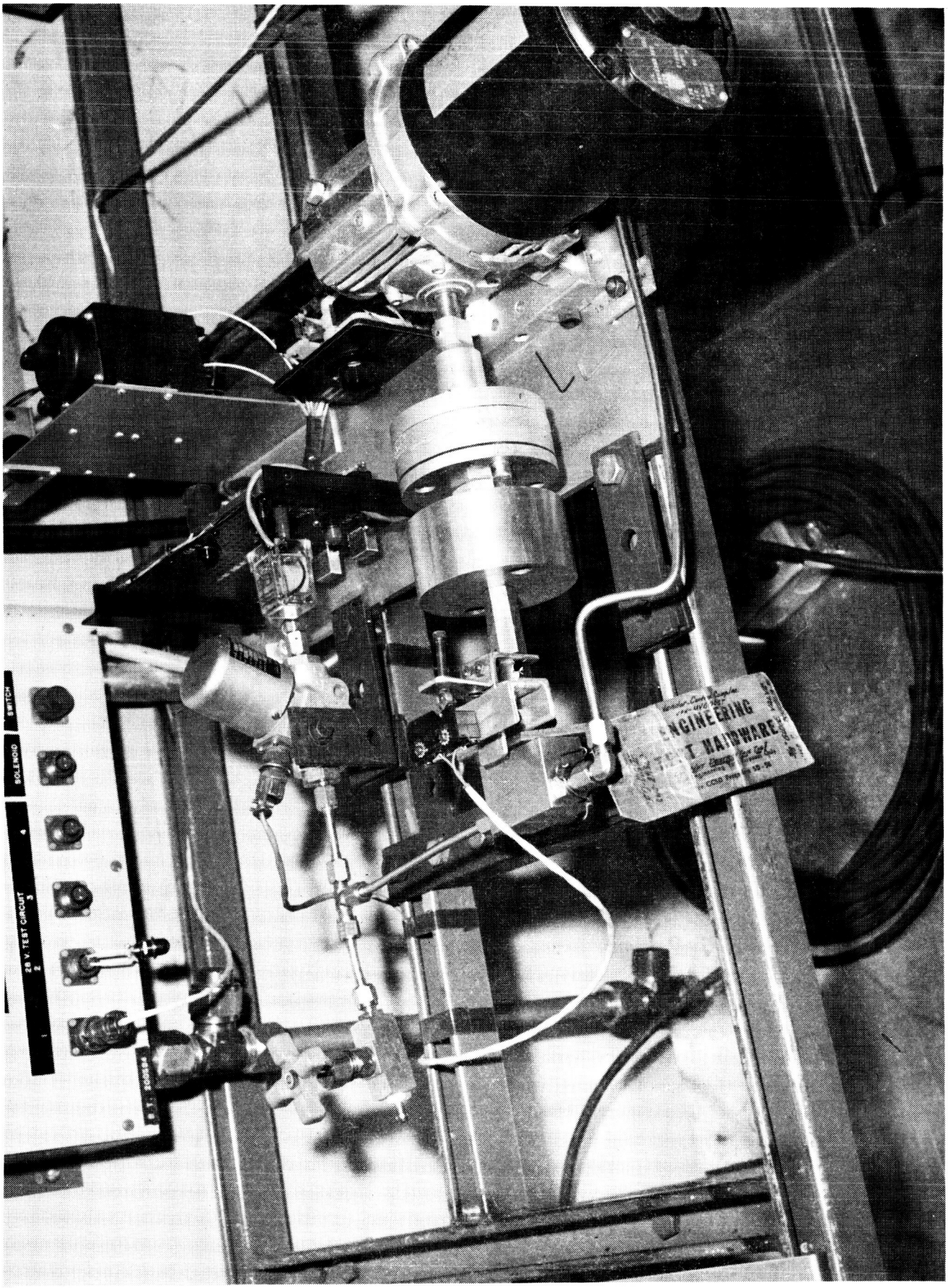


Figure 6-3. Surge and Cycle Test Setup

SECTION VII

LOW TEMPERATURE TEST

7.1 TEST REQUIREMENTS

7.1.1 The test specimen shall be subjected to a low temperature test at -20 (+0, -4)°F to determine whether the environment causes degradation or deformation.

7.1.2 The test specimen shall be subjected to a functional test in accordance with section IV during the low temperature test using helium as the test medium.

7.2 TEST PROCEDURE

7.2.1 The test specimen was installed in the test setup as shown in figures 4-1 and 7-1 using the test equipment listed in table 4-1.

7.2.2 With thermocouple 19 affixed to the specimen, thermal chamber 18 was cooled to -20°F and the relative humidity was maintained at the prescribed 60 to 90 percent.

7.2.3 Temperature stabilization was achieved and a functional test was attempted. The specimen leaked excessively.

7.2.4 The chamber was returned to ambient temperature and a second functional test was performed. No leakage was evident at ambient conditions.

7.2.5 The specimen was visually inspected within one hour of its return to ambient temperature.

7.3 TEST RESULTS

7.3.1 The specimen failed to seat with applied torques of 50, 60, 70, 80, 90, and 95 inch-pounds during the functional test at -20°F. The torque was increased to 96 inch-pounds and the specimen seated.

7.3.2 The specimen was returned to ambient conditions and ceased to leak when a torque of 30 inch-pounds was applied with the inlet port pressurized to 6000 psig.

7.4 TEST DATA

The data recorded during the test are presented in tables 7-1 and 7-2.

Table 7-1. Data on Functional Test Performed at -20°F

Run	Applied Seating Torque (in-lb)	Leakage
1	50	Excessive
2	60	Excessive
3	70	Excessive
4	80	Excessive
5	90	Excessive
6	95	Excessive
7	96	0
Specimen was returned to ambient conditions		

Table 7-2. Data on Functional Test at Ambient Conditions

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	30	6000	27	19	24	59
	30	0	10	9	21	--
	30	2	--	--	--	20
2	30	6000	27	21	26	59
	30	0	10	9	20	--
	30	2	--	--	--	18
3	30	6000	29	21	25	50
	30	0	10	8	20	--
	30	2	--	--	--	21

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	0
	30	0	6000	0

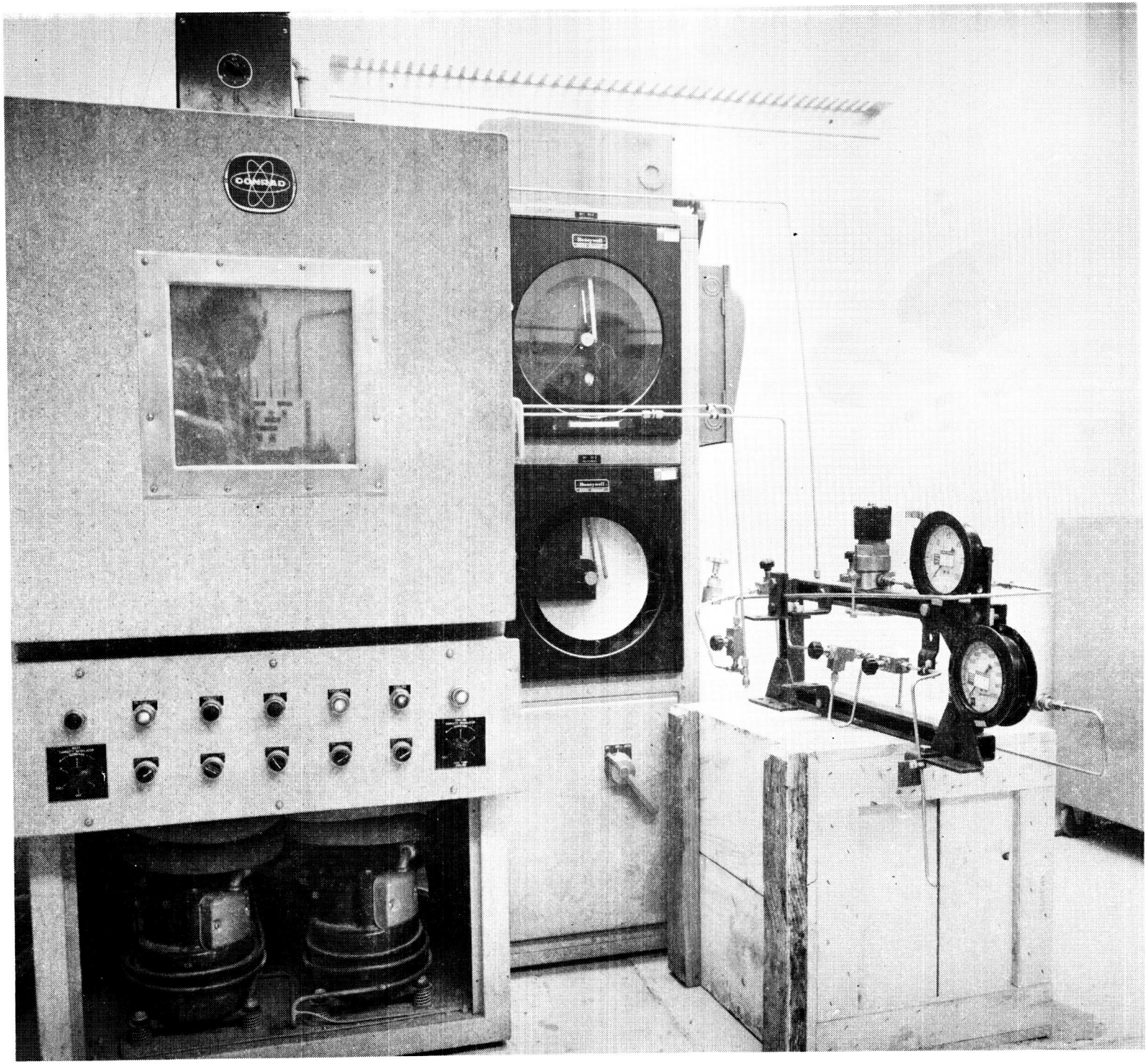


Figure 7-1. Low and High Temperature Test Setup

SECTION VIII

HIGH TEMPERATURE TEST

8.1 TEST REQUIREMENTS

8.1.1 The test specimen shall be subjected to a high temperature test at 160 (+4, -0)°F for a period of 72 (+2, -0) hours to determine if the environment causes degradation of performance.

8.1.2 The test specimen shall be subjected to a functional test in accordance with section IV during and after the high temperature test using helium as the test medium.

8.2 TEST PROCEDURE

8.2.1 The test specimen was installed in the test setup as shown in figures 4-1 and 7-1 using the equipment listed in table 4-1.

8.2.2 With thermocouple 19 affixed to the specimen, the temperature of thermal chamber 18 was increased to 160°F at a rise rate of approximately 1° per minute. The humidity was maintained at 20 percent.

8.2.3 The temperature was maintained for 72 hours after temperature stabilization.

8.2.4 A functional test was performed while the sample and chamber were maintained at 160°F.

8.2.5 The chamber temperature was returned to ambient conditions upon completion of the functional test.

8.2.6 Within one hour following the establishment of ambient conditions, a visual inspection and a functional test were performed on the specimen.

8.3 TEST RESULTS

The test specimen demonstrated no adverse effects from the thermal change.

8.4 TEST DATA

The data recorded during the test are presented in tables 8-1 and 8-2.

Table 8-1. Data on Functional Test at +160°F

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	30	6000	26	15	23	70
	30	0	31	9	7	--
	30	2	--	--	--	20
2	30	6000	29	16	24	48
	30	0	28	9	7	--
	30	2	--	--	--	17
3	30	6000	23	17	23	48
	30	0	26	9	6	--
	30	2	--	--	--	16

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	0
	30	0	6000	0

Table 8-2. Data on Functional Test at Ambient Conditions

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	30	6000	23	21	25	45
	30	0	24	9	8	--
	30	2	--	--	--	16
2	30	6000	23	20	24	46
	30	0	24	8	7	--
	30	2	--	--	--	16
3	30	6000	23	19	23	46
	30	0	24	10	9	--
	30	2	--	--	--	16

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	0
	30	0	6000	0

SECTION IX

SAND AND DUST TEST

9.1 TEST REQUIREMENTS

9.1.1 A sand and dust test shall be performed to determine the resistance of the valve specimen to the abrasive and corrosive characteristics of blown fine sand and dust.

9.1.2 The test specimen shall be subjected to 2 hours of exposure to fine sand and dust with a velocity of 100 to 500 feet per minute and a temperature of 77°F.

9.1.3 At the end of this 2-hour period the temperature shall be increased to 160°F. This temperature shall be maintained for an additional 2 hours.

9.1.4 Following the preceding exposure time, the specimen shall be allowed to cool to room temperature and shall be functionally tested and inspected.

9.2 TEST PROCEDURE

9.2.1 The inlet and outlet ports were capped and the test specimen was placed in a sand and dust chamber as specified in KSC-STD-164(D). The chamber contained sand and dust with the characteristics prescribed in KSC-STD-164(D).

9.2.2 The density of the sand and dust was maintained at 0.1 to 0.25 gram per cubic foot. The air velocity through the chamber was 100 to 500 feet per minute.

9.2.3 The internal temperature of the test chamber was set at 77°F and the system was started. These conditions were maintained for a period of 2 hours.

9.2.4 At the end of this period, the temperature was raised to 160°F. The specimen was subjected to a 2-hour test under these conditions.

9.2.5 The test specimen was removed from the chamber and allowed to cool to room temperature.

9.2.6 The accumulated dust was removed from the test specimen by brushing, wiping, and shaking. Care was taken so that additional dust was not introduced into the specimen.

9.2.7 The test specimen was subjected to a functional test as specified in section IV. The specimen was inspected for sand and dust deposits.

9.3 TEST RESULTS

The test specimen showed no deterioration or deformation after the sand and dust test.

9.4 TEST DATA

Functional test data recorded following the sand and dust test are presented in table 9-1.

Table 9-1. Data on Functional Test Following Sand and Dust Test

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	60	6000	50	24	26	25
	60	0	45	10	9	--
	60	2	--	--	--	19
2	60	6000	30	20	27	25
	60	0	20	10	9	--
	60	2	--	--	--	18
3	60	6000	45	22	27	25
	60	0	35	10	8	--
	60	2	--	--	--	20

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	60	6000	0	0
	60	0	6000	0

SECTION X

SALT FOG TEST

10.1 TEST REQUIREMENTS

10.1.1 The test specimen shall be subjected to a salt fog test. The test specimen shall be placed in a test chamber with all the equipment described in KSC-STD-164(D). The specimen shall be subjected to an atomized salt solution for a period of 240 (±2) hours.

10.1.2 The solution shall contain 5 parts by weight of salt in 95 parts by weight of water with no more than 200 parts per million of total solids. The specific gravity of the salt solution shall be from 1.023 to 1.037 with a reference temperature of 95 (+2, -4)°F. The salt solution shall also have a pH value of 6.5 to 7.2. Diluted, chemically pure (CP) hydrochloric acid or CP sodium hydrozide may be used to adjust the pH value.

10.1.3 Measurements of the characteristics of the salt solution shall be made according to KSC-STD-164(D).

10.1.4 Following the exposure of 240 hours, the test specimen shall be subjected to a functional test within 1 hour after returning to room ambient conditions.

10.2 TEST PROCEDURE

10.2.1 The test specimen was visually inspected for corrosion, dirt, and oily films. All unnecessary oily film and dirt particles were removed. No corrosion spots were observed.

10.2.2 The test specimen was placed in a chamber as shown in figure 10-1 with its ports capped.

10.2.3 The chamber temperature was adjusted to 95 (+2, -4)°F and the salt solution density was adjusted so that the clean fog-collecting receptacle in the exposure zone would collect from 0.5 to 3 milliliters of solution per hour for each 80 cm^2 of horizontal collecting area.

10.2.4 These conditions were maintained for 240 hours.

10.2.5 At the end of the 240-hour period, the test specimen was removed from the chamber and allowed to return to room ambient conditions.

10.2.6 The salt deposits were removed from all threaded areas to provide adequate mechanical connections.

10.2.7 After returning the specimen to room ambient conditions, a functional test was performed, as specified in section IV.

10.2.8 The test specimen was inspected and all salt deposits were removed.

10.3 TEST RESULTS

The test specimen showed no deterioration or deformation after the salt fog test.

10.4 TEST DATA

Functional test data recorded following the salt fog test are presented in table 10-1.

Table 10-1. Data on Functional Test Following Salt Fog Test

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	60	6000	60	15	25	17
	60	0	50	10	7	--
	60	2	--	--	--	10
2	60	6000	55	15	20	15
	60	0	55	10	5	--
	60	2	--	--	--	8
3	60	6000	55	15	20	20
	60	0	50	8	6	--
	60	2	--	--	--	10

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	60	6000	0	0
	60	0	6000	0

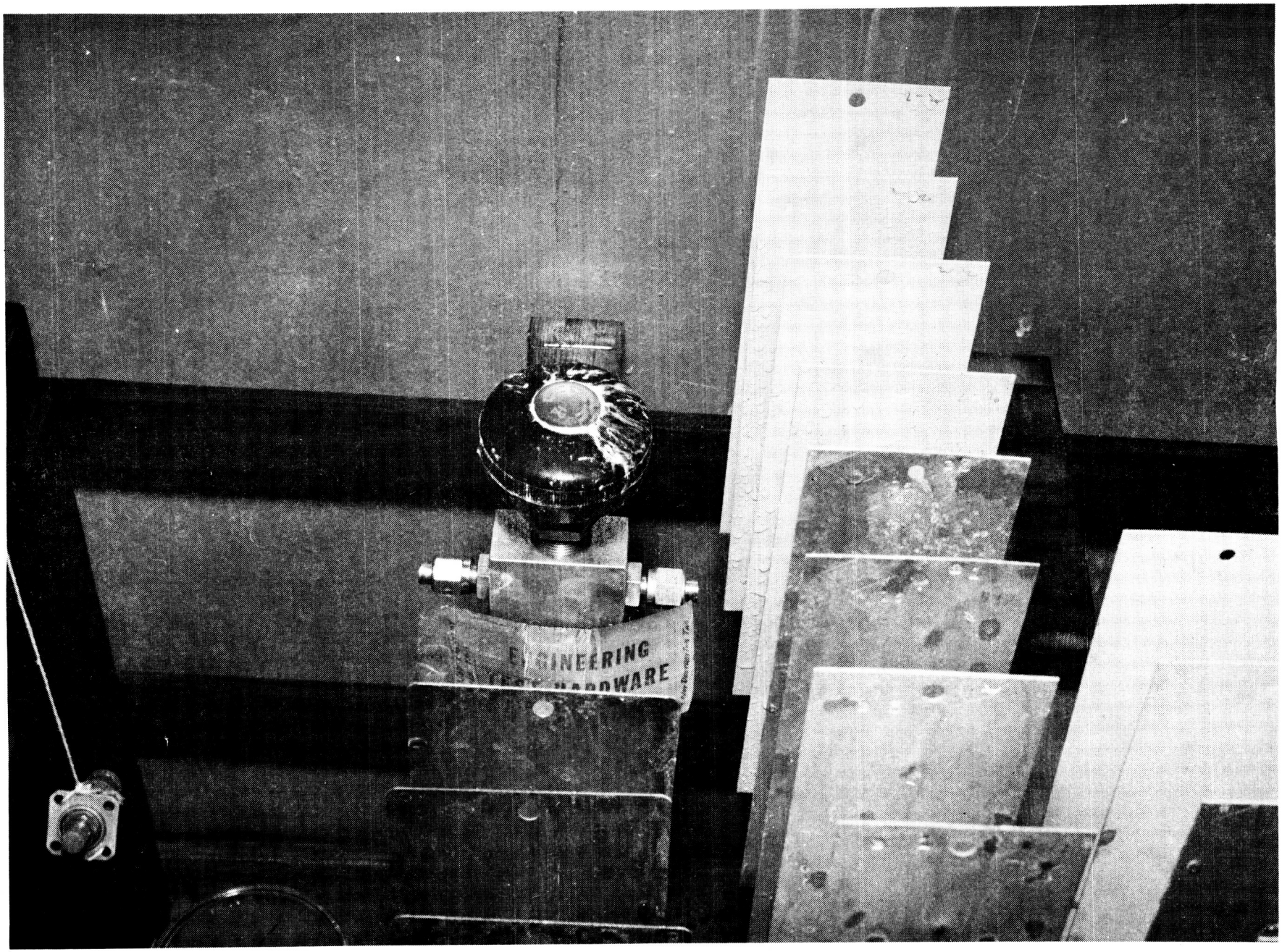


Figure 10-1. Salt Fog Test Setup

SECTION XI

CYCLE TEST

11.1 TEST REQUIREMENTS

11.1.1 The test specimen shall be subjected to 1000 cycles during the cycle test.

11.1.2 Each cycle shall consist of pressurizing the inlet port to 6000 psig and then opening and closing the specimen. GN_2 shall be the test medium.

11.1.3 The specimen downstream pressure shall be vented to below 3100 psig after each cycle.

11.1.4 A functional test, as specified in section IV, shall be performed following the completion of 50, 100, 500, and 1000 cycles.

11.2 TEST PROCEDURE

11.2.1 The specimen was installed in the test setup as shown in figures 6-2 and 6-3 utilizing the equipment listed in table 6-1.

11.2.2 All hand valves and regulator 5 were adjusted for zero pressure.

11.2.3 Hand valve 2 was opened and gage 4 was monitored for a 7000 psig reading.

11.2.4 Regulator 5 was adjusted to establish a 6000 psig reading on gage 6 and hand valve 7 was opened.

11.2.5 The electrical network was adjusted to produce the following:

a. Solenoid valve 8 was actuated to pressurize the specimen to 6000 psig, as read from gage 6.

b. Solenoid valve 13 was actuated to close outlet port during specimen opening and closing. Hand valve 12 was opened.

c. Switch 18 was closed to signal 440 vac reversible electrical motor 14 to open and close the specimen.

d. Hand valve 9 was opened and solenoid valves 8 and 13 were deactuated to vent pressure from the specimen to below 3000 psig downstream, as read from gage 10.

11.2.6 Functional tests were performed after 50, 100, 500 and 1000 cycles of the specimen.

11.3 TEST RESULTS

The test specimen successfully withstood 1000 operational cycles without degradation or deformation. The torque needed to seat the specimen during and following the functional tests was slightly

higher than the original proposed; however, the results were acceptable to CCSD-FO.

11.4 TEST DATA

11.4.1 A functional test was performed due to a 72-hour time lapse since the previous functional test (see table 11-1).

11.4.2 Functional test data after 50, 100, 500, and 1000 cycles are presented in tables 11-2, 11-3, 11-4 and 11-5.

Table 11-1. Functional Test Data After 72 Hours Lapse Time

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	50	6000	50	35	30	45
	50	0	45	6	7	--
	50	2	--	--	--	30
2	60	6000	55	25	28	45
	60	0	25	10	8	--
	60	2	--	--	--	30
3	60	6000	60	25	30	60
	60	0	30	8	8	--
	60	2	--	--	--	30

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	50	6000	0	0
	50	0	6000	0

Table 11-2. Functional Test Data After 50 Cycles

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	30	6000	30	25	35	80
	30	0	30	5	7	--
	30	2	--	--	--	30
2	80	6000	70	30	35	75
	80	0	25	8	5	--
	80	2	--	--	--	25
3	75	6000	60	30	35	75
	75	0	22	8	6	--
	75	2	--	--	--	30

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	40	6000	0	0
	30	0	6000	0

Table 11-3. Functional Test Data After 100 Cycles

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	60	6000	45	25	35	85
	60	0	45	5	5	--
	60	2	--	--	--	25
2	85	6000	65	27	35	75
	85	0	20	5	5	--
	85	2	--	--	--	25
3	75	6000	70	25	33	75
	75	0	70	5	7	--
	75	2	--	--	--	25

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	50	6000	0	0
	60	0	6000	0

Table 11-4. Functional Test Data After 500 Cycles

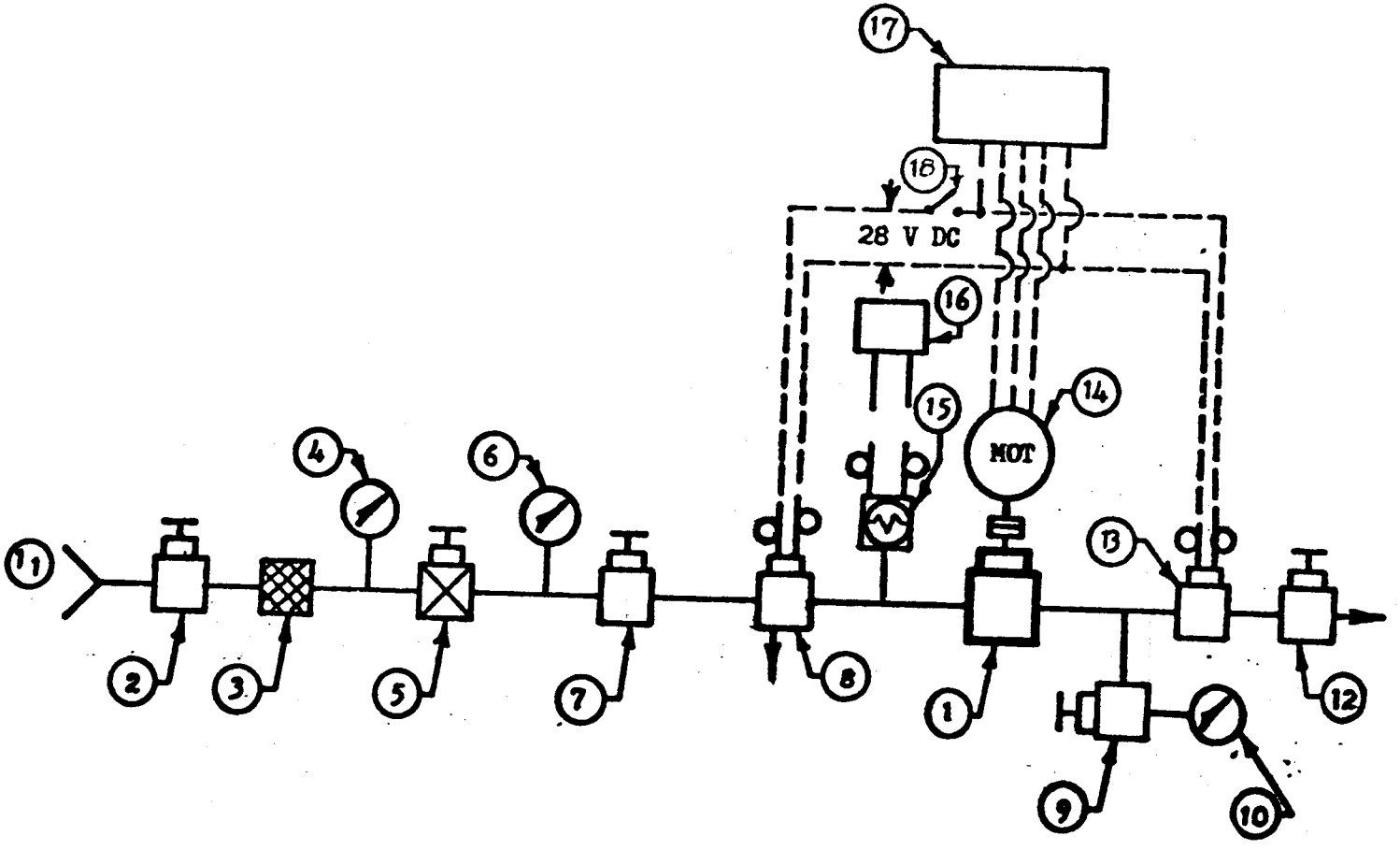
Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	95	6000	75	27	35	70
	95	0	25	7	6	--
	95	2	--	--	--	30
2	70	6000	55	25	35	95
	70	0	20	8	6	--
	70	2	--	--	--	30
3	95	6000	75	28	35	90
	95	0	25	8	7	--
	95	2	--	--	--	30

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	40	6000	0	0
	95	0	6000	0

Table 11-5. Functional Test Data After 1000 Cycles

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	100	6000	90	33	35	120
	100	0	50	7	5	--
	100	2	--	--	--	65
2	120	6000	95	30	35	120
	120	0	55	8	5	--
	120	2	--	--	--	65
3	120	6000	100	32	35	120
	120	0	50	7	5	--
	120	2	--	--	--	60

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	120	6000	0	0
	100	0	6000	0



Note: All lines are 1/2-inch except for gage lines which are 1/4-inch.
Refer to table 6-1 for item identification.

Figure 11-1. Surge Test Schematic

SECTION XII

BURST TEST

12.1 TEST REQUIREMENTS

12.1.1 The specimen shall be subjected to a hydrostatic pressure of 24,000 psig.

12.1.2 The hydrostatic pressure shall be simultaneously applied to the specimen inlet and outlet ports with the valve in the open position. The pressure shall be maintained for 5 minutes.

12.2 TEST PROCEDURE

12.2.1 The test specimen was installed in the test setup as shown in figures 3-1 and 3-2 utilizing the equipment listed in table 3-1.

12.2.2 Hand valve 7 and regulator 21 were closed.

12.2.3 The test specimen and hand valves 5, 6, 8, 9, 10, 11 and 24 were opened and the system was filled with water. All air was bled from the system.

12.2.4 Hand valves 5, 8, 9, 11, and 24 were closed.

12.2.5 Hand valve 7 was opened, and 3000 psig GN_2 was monitored on gage 14.

12.2.6 Regulator 21 was adjusted until a pressure of between 50 and 100 psig was indicated on gage 15.

12.2.7 Switch 17 was then closed. Solenoid valve 18 was opened and pump 19 started.

12.2.8 The pump continued to operate until a pressure of 22,000 psig was reached. At that level, a water leak was noticed under the door of the burst chamber. The pressure then decreased and all attempts to bring the pressure up failed.

12.2.9 Hand valves 9, 11, and 24 were opened and the system was vented.

12.2.10 All data were recorded.

12.3 TEST RESULTS

12.3.1 The specimen did not reach 24,000 psig during the burst test. Water leakage occurred at 22,000 psig through the packing gland and escaped around the packing gland nut.

12.3.2 The valve was disassembled and inspected. The valve showed no sign of distortion to the packing gland. The valve was re-assembled and 200 inch-pounds of torque was applied to the packing nut. The test was again performed and maintained at 24,000 psig for 5 minutes without leaking.

12.4 TEST DATA

Test data are presented in table 12-1.

Table 12-1. Burst Test Data

Specimen	Ports Pressurized	Seating Torque Applied	Minimum Allowable Burst Pressure	Pressure Applied	Remarks
1	Inlet and outlet ports	120 in-lb	24,000 psig	22,000 psig	Leaked through packing gland
1	Inlet and outlet ports	200 in-lb	24,000 psig	24,000 psig	After specimen was disassembled, inspected and re-assembled; no leakage occurred.

APPROVAL

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

SUBMITTED BY:

G. Collins
Test and Evaluation Section

APPROVALS

R. W. Claunch
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V. J. Vehko, Director
Engineering Department

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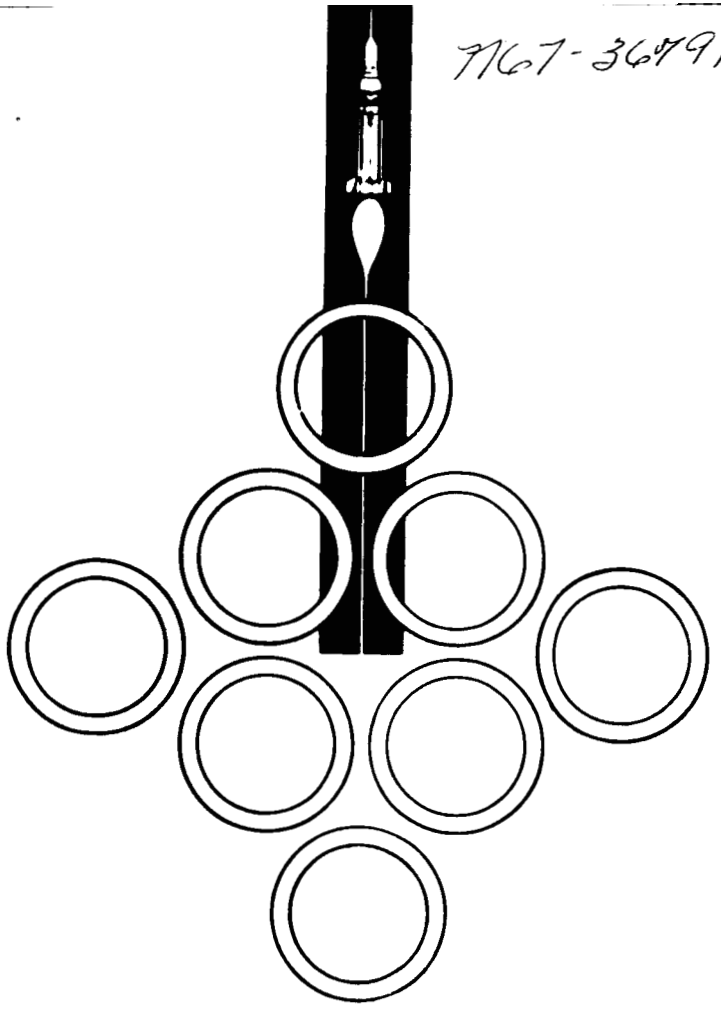


TR-RE-CCSD-FO-1116-3

ADDENDUM I

January 10, 1967

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

SPACE DIVISION CHRYSLER CORPORATION

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

ABSTRACT

This report presents the results of functional and seat erosion tests of Globe Valve 75M09618 PGLV-2. The seat erosion test, not originally required by procedures TP-RE-CCSD-FO-1116-2F, was performed to determine if high velocity GN_2 flow causes degradation or deformation of the valve seat.

Before the test was performed, new soft goods were installed in the valve.

The specimen's performance was in accordance with specification requirements of NASA Drawing Number 75M09618 PGLV-2.

SECTION XIII

SEAT EROSION TEST

13.1 TEST REQUIREMENTS

13.1.1 A seat erosion test will be performed on the test specimen to determine whether high velocity GN_2 flow causes degradation or deformation.

13.1.2 The specimen shall be set to flow approximately 100 SCFM of GN_2 with an inlet pressure of 6000 psig and an outlet pressure below 50 psig. The flow rate shall be maintained for four hours.

13.1.3 A functional test shall be performed in accordance with Section IV immediately before and within one hour following this test, and the seat of the specimen shall be inspected for deterioration. If leakage is encountered during the functional test before or after the seat erosion test, the specimen's soft goods shall be replaced and the functional test repeated.

13.2 TEST PROCEDURE

13.2.1 The test setup was assembled as shown in figures 13-1 and 13-2 using the equipment listed in table 13-1.

13.2.2 Hand valve 3 was closed and pressure regulator 5 was adjusted for zero outlet pressure.

13.2.3 Hand valve 3 was opened.

13.2.4 Pressure gauge 8 read over 7000 psig.

13.2.5 Pressure regulator 5 was adjusted to establish 6000 psig on pressure gauge 6.

13.2.6 Test specimen 1 was slowly opened until pressure gauge 7 read 21.7 psi and temperature recorder 11 indicated approximately zero degrees. These conditions correspond to 100 SCFM flow through nozzle 9.

13.2.7 The flow was continued for four hours. Pressure gauge 7 and temperature recorder 11 were monitored to detect any change in flow rate which might indicate erosion of the valve seat.

13.2.8 Hand valve 3 was closed and test specimen 1 was removed from the system.

13.2.9 A functional test was performed within one hour following this test (see 13.1.3).

13.2.10 Test specimen 1 was disassembled. The valve seat was inspected and photographed.

13.2.11 All test data were recorded.

13.3 TEST RESULTS

The specimen withstood the 100 SCFM flow of GN_2 for a period of four hours with no degradation or deformation of the valve seat.

13.4 TEST DATA

The test data recorded during the seat erosion test and functional tests before and after the seat erosion test are recorded in tables 13-2 through 13-4.

Table 13-1. Seat Erosion Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	James, Pond and Clark, Inc.	BR949T1-6BB(T9)	NASA 75M09618 PAV-2	3/8-inch Angle Valve
2	GN_2 Source	Air Products	NA	NA	7000 psig
3	Hand Valve	Cardair	3510-0077	NA	1-1/2-inch
4	Filter	Permanent Filter Division	9377-3154	CPB-010	2 micron
5	Pressure Regulator	Tescom Corp.	26-1021-10	1529	7000 psig inlet 0 to 6000-psig outlet
6	Pressure Gauge	Heise	H-34955	014231	0-to 10,000 psig ±2% FS accuracy Cal. date: 7/17/67
7	Pressure Gauge	Heise	NA	95-1409-B	0-to 100 psig ±1% FS accuracy Cal. date: 5/18/67
8	Pressure Gauge	Heise	H-35980	015536	0-to 10,000 psig ±2% FS accuracy Cal. date: 8/1/67
9	Nozzle	Flow-Dyne	XN1604 30-5A	2375	Calibrated nozzle to flow 100 SCFM of GN_2 at inlet pressure of less than 50 psig. Throat disc 0.4545
10	Thermocouple	Minneapolis	30112	NA	-50 to 100°F
11	Temperature Readout	West Instrument Company	NA	019457	-100 to 400° Cal. date: 10/16/67

Table 13-2. Functional Test Data Sheet (Pre-Seat Erosion Test)

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	75	0	6000	0
2	75	6000	0	0

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	50 20 75	6000 0 2	50 15 40	15 2 5	25 6 10	75 15 30
2	75 20 30	6000 0 2	55 15 20	15 2 5	25 6 10	75 15 30
3	75 20 30	6000 0 2	50 15 20	15 2 5	25 6 10	75 15 30

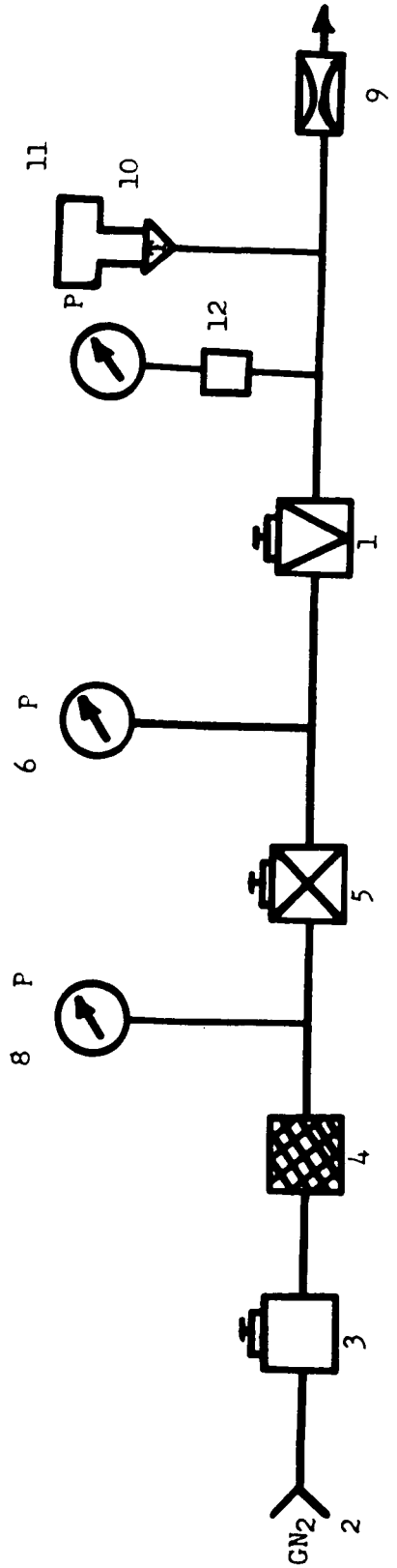
Table 13-3. Functional Test Data Sheet (Post-Seat Erosion Test)

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	50	0	6000	0
2	50	6000	0	0

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
1	50 15 65	6000 0 2	40 5 35	12 3 5	25 5 10	75 15 25
2	75 15 25	6000 0 2	55 5 10	15 2 3	25 5 10	70 15 25
3	70 15 25	6000 0 2	50 5 10	12 1 5	25 5 10	65 15 25

Table 13-4. Four Hour Seat Erosion Test Data

Half Hour Read-ings	Specimen Inlet Pressure (psig)	Specimen Outlet Pressure (psig)	Temperature		Flow Rate (SCFM)
			F	Rankine	
1	6000	21.7	3	463	100 SCFM (±5 SCFM) through calibrated flow nozzle .4545 inch diameter
2	6000	21.6	0	460	
3	6100	21.9	4	464	
4	6000	20.7	1	461	
5	6000	22.1	0	460	
6	6000	20.2	5	465	
7	6000	22.0	4	464	
8	6000	21.7	0	460	
9	6000	21.3	4	464	



Note: Refer to table 13-1 for item identification.

Figure 13-1. Seat Erosion Test Schematic

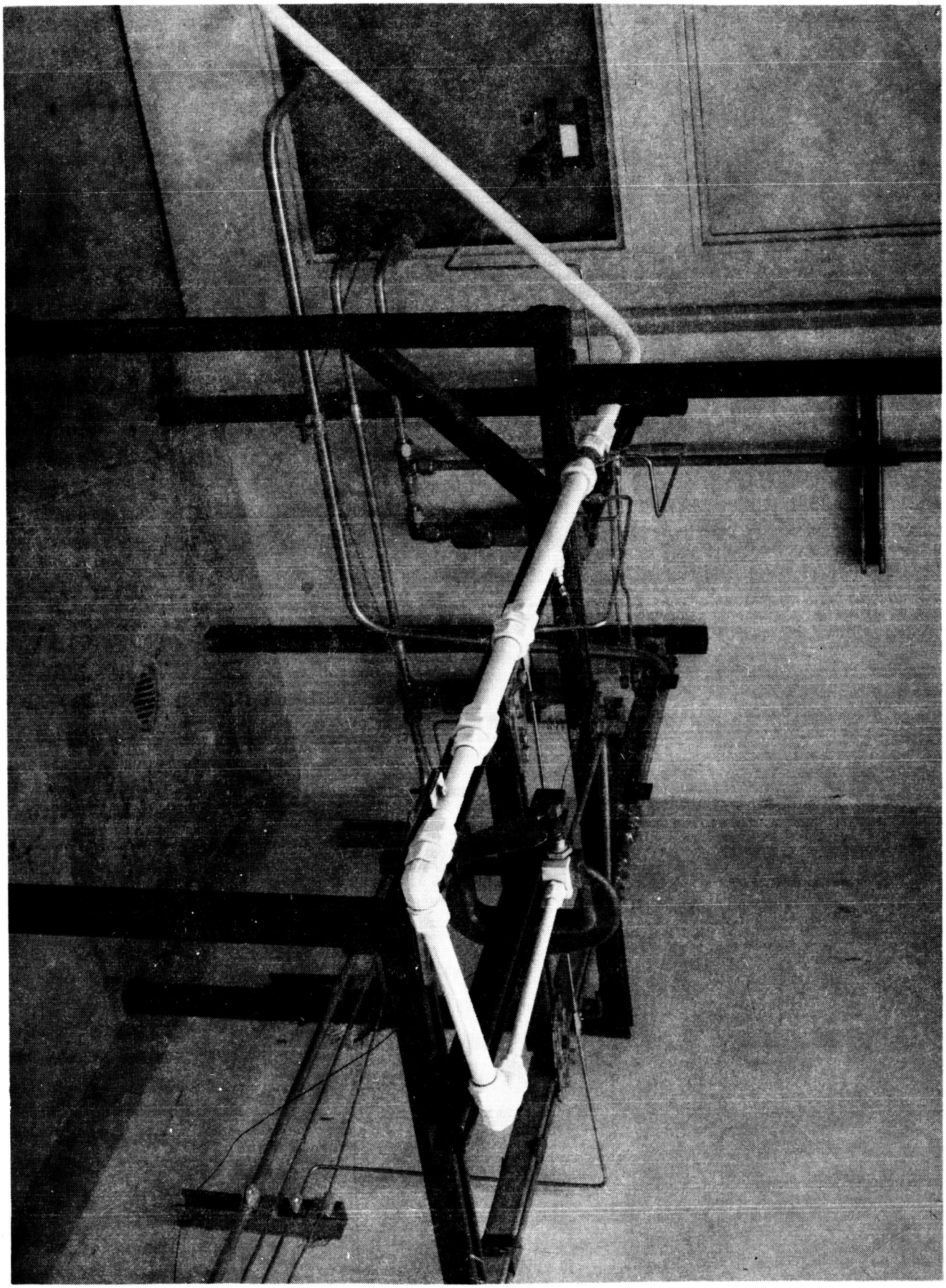


Figure 13-2. Seat Erosion Test Setup

APPROVAL

ADDENDUM I

TEST REPORT

FOR

GLOBE VALVE, 3/8-INCH, 6000 PSIG

Control Components Incorporated Part Number MV6306T-P

NASA Drawing Number 75M09618 PGLV-2

SUBMITTED BY:

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